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Environmental Assessment, Hackberry Draw Watershed

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INTRODUCTION

The Hackberry Draw Watershed District and the Carlsbad Soil and Water Conservation District, in cooperation with the City of Carlsbad, Eddy County and the United States Department of Agriculture, Natural Resource Conservation Service (NRCS) propose to rehabilitate Dams 1 and 2 and Floodwater Diversion 1 of the Hackberry Draw Watershed Project. The rehabilitation is a federally assisted action, and NRCS is the lead federal agency.

This environmental assessment (EA) is being prepared by the NRCS to comply with the requirements of the National Environmental Policy Act of 1969 and its implementing regulations, which are 40 CFR Parts 1500-1508. The EA will assist NRCS in determining whether the selected alternative will have a significant impact on the quality of the human environment and, therefore, requires preparation of an Environmental Impact Statement.

Purpose and Need for Action

There is a need to increase the safety and reliability of flood protection in the areas protected by Dams 1 and 2, which are a part of the Hackberry Draw Watershed Project in Eddy County, New Mexico. Specifically, the needs are to:

- Provide flood protection for storms up to the 100-year storm event in rural subdivisions along Hackberry Draw, including the community of Happy Valley.
- Provide flood protection against storms originating over Hackberry Draw and for storms up to the 100-year storm event within the City of Carlsbad, including areas north of Lea Street and east of Southern Canal.
- Provide flood protection for storms up to the 50-year storm event on agricultural cropland along Hackberry Draw.
- Meet current New Mexico and NRCS dam standards for public safety and capacity.

The purpose of the action is to better provide for public safety in the community of Happy Valley and the City of Carlsbad. The project will not address all of the known problems in the lower watershed (in areas not currently protected by the Hackberry Draw Watershed Project), but may help project sponsors better understand issues in that area.

Background

The Hackberry Draw Watershed District and Carlsbad Soil and Water Conservation District originally installed the Hackberry Draw Watershed Project in 1967/8. The Soil Conservation Service provided Federal assistance through the Watershed Protection and Flood Prevention Act (P.L.83-566). The Soil Conservation Service is now the NRCS.

The purpose of the Hackberry Draw Watershed Project as originally developed was to reduce average annual flood damages by at least 75 percent in the upper watershed. As originally designed the project included four floodwater diversions (denoted FD-1, 2, 3 and 4 on Figure 2) and three floodwater retarding structures (dams denoted sites 1, 2 and 3 on Figure 2). These structures were designed to work together as a single system and control flood flows for all storm events smaller than or equal to the 50-year storm event. (The 50-year storm event has a 2-percent chance of being equaled or exceeded in any year.)

Over the past 34 years, the project has largely fulfilled its original purpose, although several modifications to the original design have occurred. Most notably, one of the original dams (Site 3) failed when sinkholes appeared under its embankment, and escaping floodwater damaged downstream properties. In order to regain the system's flood protection, FD-2 was rebuilt in 1981 to compensate for the failure (and subsequent removal) of Site 3; the reconstruction included lengthening FD-2 and modernizing of the design to assure adequate protection in the event of a 100-year storm event. Sinkholes and cracks have also appeared in Site 1 and FD-1; repairs to these structures have been limited to the immediate problem areas.

The current study was initiated to re-evaluate existing structures and consider rehabilitation and alternative means of providing flood protection in the area protected by the existing Hackberry Draw Watershed Project. The project area is defined as the Hackberry Draw Watershed upstream (or west) of Southern Canal. (Refer to the project map in Appendix B.) At the time of installation, the land use in the project area included rangeland, irrigated cropland, and miscellaneous land (including roads, highways, irrigation canals, residential areas, and vacant land). Table compares project area land uses in 1961 and 1998. The total acreage in 1998 tabulation is 2,161 acres larger than that reported in the 1961 analysis because the original work plan underestimated the drainage area of Site 1, and the current analysis indicates that the impacts of a dam breach or of decommissioning alternatives would extend east of Southern Canal. The drainage area for Site 1 was corrected in 1965 during design, and thus did not affect the design of the dam. The flood plain maps may be found in Appendix B.

Table A. Land Use in 1961 and 1998

Land Use	1961		1998	
Federal Rangeland	2,560 acres			
State Rangeland	1,920			
Private Rangeland	7,550			
Total Rangeland	12,030 acres	87.4 %	10,000 acres	62.8 %
Irrigated Cropland	1,460	10.6	1,212	7.6
Miscellaneous Use [1]	270	2.0	4,709	29.6
Total Acreage	13,760 acres	100.0 %	15,921 [2]	100.0

In 1961, Happy Valley had a population of about 400 people, and the watershed project area had a population of about 600 people. About 150 homes were subject to flood damage. Currently, about 850 people and 500 homes and businesses would be subject to flood damages if the project had not been built. According to the 1990 Census, the total population of the project vicinity is approximately 8,000 people.

Currently, the flood control measures of the Hackberry Draw Watershed Project reduce flood flow so that the flood plain of the 100-year storm event turns south at Southern Canal and follows along the canal and drains into Dark Canyon. The 100-year flood plain is the basis for flood insurance premiums. In the future if these project measures fail, Southern Canal will breach, and flood flows will damage downtown Carlsbad. This will affect an additional 1,500 residents and 750 homes and businesses.

[1] Miscellaneous Use includes roads, highways, irrigation canals, residential areas and wasteland.
[2] This acreage is larger because the original work plan underestimated the watershed area and new flood plain maps extend east of Southern Canal.

Catastrophic failure of the Hackberry Draw Watershed Project structures would contribute to the failure of the Canal, and increase flood potential in the area east of Southern Canal. However, sufficient uncontrolled drainage exists in the lower watershed area that some flood damage will occur even if the Hackberry Draw structures do not fail. In 1961, another Federal flood control project was being planned, at the downstream edge of the Hackberry Draw Watershed Project, to address flood problems in the lower watershed. This second project would have constructed a channel and dike along the west bank of Southern Canal and would have increased the capacity of Dark Canyon. This second project has not been constructed to date.

The Hackberry Draw Watershed Project provides flood damage reduction benefits equal to $770,900 per year. These are the average annual benefits as calculated using Principle and Guidelines (US-WRC, 1983). The project originally cost $7,469,980 and has been providing benefits since 1967. Table A-1 (in Appendix A) displays the land treatment and structural measures included in the project and their cost of installation. Table A-1 displays the actual (not inflation adjusted) dollars expended to build the project.

The project area includes two primary ecological (or range) sites. They are typical desert range sites and reflect expected vegetation associated with annual precipitation of 10 inches about 80 percent of the precipitation occurs during summer months in the form of rainfall. Elevation ranges from 3,135 to 3,745 feet above sea level. The upland vegetation community consists of creosote bush, black grama, mesquite, and bush muhly. The bottomland range site community of giant sacaton, tobosa, cane bluestem, fourwing saltbush, and mesquite is located along the draw and in the (dry) pool areas upstream of the dams.

ALTERNATIVES

Four alternatives were considered to address the project need: a no action alternative, a decommissioning and relocation alternative, a flood proofing and relocation alternative, and a structural enhancement alternative. The no action alternative, which does not meet the project need, was considered as the basis of comparison for the other alternatives, each of which was formulated to provide improved future flood protection. Accordingly, dam decommissioning, relocation, and flood proofing were considered for the area partially or completely protected by the existing structures, and structural improvements were considered to address inherit design limitations of the existing dams. The actions associated with each alternative are described below; benefits and impacts of each alternative are described in a subsequent section "Effects of the Alternatives." Since authority for this action is tied to dam rehabilitation components of the authorizing act (Section 382 of Public Law 104-127, also known as Title III of the 1996 Farm Bill) the project will consider improvements to Site 1 (and its associated Flood Diversion, FD-1) and Site 2. Improvements to FD-3 and FD-4 are outside the purview of the current action. FD-2 was upgraded to current standards in 1981 so no additional improvements are needed.

Alternative 1—No Action Alternative

The first alternative is the no action alternative. The present project will continue to operate as it has for the past 34 years. Sites 1 and Site 2, and Floodwater Diversion 1 will continue to provide flood protection for storms up to and including the 50-year storm event. The Hackberry Draw Watershed District will continue to operate and maintain the project. Due to the risk of failure, the Hackberry Draw Watershed District has an emergency action plan, which includes an

emergency evacuation plan. These plans have been incorporated into the emergency management functions of Eddy County and the City of Carlsbad. Under this alternative, the emergency action and evacuation plans will be practiced annually.

Alternative 2—Decommission the Dams

The second alternative will remove the two dams, relocate approximately 825 homes and businesses, and flood-proof approximately 135 homes and businesses. Buildings subject to flooding by the 25-year storm event will be relocated. Buildings, inside the 100-year flood plain but outside the 25-year flood plain, will be flood-proofed. Land-use control, or zoning, will limit development and improvements within the 100-year flood plain. Sites 1 and 2 and Floodwater Diversion 1 will continue to provide flood protection for storms up to and including the 50-year storm event. The Hackberry Draw Watershed District will continue to operate and maintain the floodwater diversions; will ensure that installed flood proofing is maintained; and will ensure that zoning or land-use control is effective.

Alternative 3—Relocation and Flood-proofing

The third alternative will not make any changes to the dams but will relocate approximately 320 homes and businesses located inside the 25-year flood plain and flood-proof approximately 60 homes and businesses located inside the 100-year flood plain but outside the 25-year flood plain. Land use control, or zoning, will limit development and improvements within the 100-year flood plain. Sites 1 and 2, and Floodwater Diversion 1 will continue to provide flood protection for storms up to and including the 50-year storm event. The Hackberry Draw Watershed District will continue to operate and maintain the existing project measures, will annually practice the emergency action and evacuation plans, will ensure that installed flood proofing is maintained, and will ensure that zoning is effective.

Alternative 4—Rehabilitate the Dams

The fourth alternative will upgrade Sites 1 and 2, and Floodwater Diversion 1 to high hazard structures using New Mexico and NRCS dam safety standards. Land use control will not be needed because high hazard structures are designed to protect people living downstream of the dam for the storms up to and including the 100-year storm event. Dams have an inherent risk of failure. Therefore, effective maintenance and operation will continue to be necessary. The Hackberry Draw Watershed District will continue to operate and maintain the project. Also, an updated evacuation plan, based on new flood plain maps, will be needed and will be incorporated into the existing emergency action plan. Emergency management personnel for Eddy County and the City of Carlsbad work with the Hackberry Draw Watershed District on being prepared to implement the emergency action plan.

The dams will be upgraded using one of two options. One option is to increase the height of the dams so that the 100-year storm event would be contained and the probable maximum precipitation would pass through the auxiliary spillways. Using this option the dam would not be overtopped. The other option is to increase flood storage so that the 100-year storm event is contained and to harden the auxiliary spillways and dams so that they withstand flow through the auxiliary spillways and over the dams.

UNIQUE, PROTECTED, AND OTHER SPECIAL RESOURCES

The United States public has economic, environmental, and social concerns that the NRCS is entrusted to identify and address. These public concerns are: air quality, cultural resources, ephemeral gully erosion, fish habitat, flood and sediment damage, human health and safety, important agricultural land, mineral resources, minority or disadvantaged groups, municipal and industrial water, navigation, noxious weeds, recreation, riparian areas, rural water supply, soil erosion, threatened and endangered species, transportation, visual resources, water quality, water quantity, wetlands, and wildlife habitat. Flood and sediment damage, human health and safety, recreation, transportation, and visual resource concerns are discussed by alternative in the next section, "Effects of the Alternatives."

The area and setting of this project are described in four references: the 1961 Work Plan; the 1979 Supplemental Deficiency Report; and the Environmental Assessments, which were completed in 1981 and 1998. This EA draws on those documents for baseline, current, and future resource conditions. Alternative effects in this EA are compared using information contained in those references. In addition, NRCS conducted reviews of the area to identify unique, protected, and other special resources. The results of these reviews are described in the following paragraphs. If affected differently by each alternative, the concern is further discussed in the next section, "Effects of the Alternatives."

Ephemeral gully erosion, fish habitat, important agricultural land, mineral resources, municipal and industrial water, and rural water supply will not be affected by any of the alternatives. The dams are dry dams, which capture flood flows and release the floodwater slowly over four days. None of the alternatives will change ephemeral gully erosion. The Pecos River provides fish habitat, and irrigation canals provide temporary fish habitat during the summer when water is flowing through the canals. None of the alternatives will affect fish habitat in either location. There is no prime, unique, or important farmland in the project area. Farmland within the project area is currently adjacent to residential areas, and urban infrastructure (i.e., streets and utilities) currently exists along field boundaries. Therefore, none of the alternatives will affect important agricultural land. Oil and natural gas wells are located in the project area, but they will not be affected by any of the alternatives. None of the alternatives will impact other mineral resources, since no others are extracted from the project area. Water and sewage treatment plants are not located in the project area or in the flood plain of any alternative. Power, telephone, and cable utilities use overhead lines, which will not be affected by flooding. Hence, none of the alternatives will impact municipal and industrial water or rural water supply.

Navigation, noxious weeds, riparian areas, water quantity, and wetlands will not be affected by any of the alternatives. There is no navigable water within the project area. In 1997, a colony of noxious weeds (malta starthistle, *Centaurea melitensis L.*) was found on Site 1. During 1998, construction equipment excavated and buried this colony. There are no other noxious weeds in the project area, and none of the alternatives will affect noxious weeds. A riparian plant community, sustained by ground water associated with the river, is located at the confluence of Dark Canyon and the Pecos River; however, there are no riparian plant communities along Hackberry Draw or elsewhere in the project area. Therefore, none of the alternatives will affect riparian plant communities. Since the dams store no water, they have no effect on water quantity. Since there are no jurisdictional wetlands in the project area, none of the alternatives will affect wetlands.

The NRCS has determined that this project will have no affect on listed endangered or threatened species. This determination is based on biological findings in the literature and on site investigations as described in Appendix A. Appendix A also shows that the alternatives will have minimal affect of wildlife habitat.

Air quality, soil erosion, and water quality are normally impacted by construction. However, the impact is short-term and occurs during the period of construction. An increase in particulate matter (dirt and dust) will result from the operation of construction equipment. The wind carries the particulate and will erode dirt particles from bare construction areas. Exhaust from construction equipment is also released into the atmosphere.

The impact to water quality is soil particles carried by storm runoff from bare construction areas. Therefore, soil erosion affects both the air and water quality. However, contractors and construction workers are required by law to control air and water-borne dirt and dust. Silt fences and other techniques are used to keep most of this material from leaving the construction site. In addition, all NRCS construction contracts contain a pollution control specification, requiring contractors to control erosion and air and water quality. Happy Valley uses individual septic systems with leach fields, and floodwater may affect these systems due to erosion or infiltration, which could result in system malfunctions, including unintentional releases. Released septic effluent may cause disease.

A cultural resource records check and literature review has been completed for the project vicinity, and a variety of cultural resource sites are located throughout the area. Sites range from historic structures in Carlsbad and historic homesteads and trash dumps in the surrounding area to prehistoric mescal roasting pits and lithic scatters. Sites are present in the uplands away from Hackberry Draw as well as in the flood plain; there are no recorded sites within proposed areas of disturbance. A complete pedestrian survey will be completed once the final extent of the project activity has been determined. Final consultation with New Mexico State Historic Preservation Officer (SHPO) and Native American groups with an interest in the area will be completed prior to final construction authorization. Additionally, if significant cultural resources are discovered during construction, appropriate notice will be made by NRCS to the SHPO and interested tribes. NRCS will take action as prescribed in NRCS General Manual 420, Part 401, to protect or recover any significant cultural resources.

Minority or disadvantaged individuals and groups live and work throughout Eddy County and within the project area. The aerial photographs of the project area depict generally small lots with correspondingly small housing units within the flood plain. Flooding will negatively impact these houses, which are occupied by many financially disadvantaged persons across most ethnic groups. The Hispanic population is, by far, the largest sector. In Table B, note the (average) per capita income for the Black and Hispanic populations within both census tracts is below the poverty level of $8,000. The same is true for the American Indian population in Tract 0004 and the White population in Tract 0005. The exceptions are some American Indians in Tract 0005 and the Asian or Pacific Islanders in Tract 0004. Due to their much higher per capita incomes, these exceptions would be found in the larger housing units in the upscale neighborhoods of these two census tracts. These neighborhoods are generally outside the flood plain. Near South Canal Street, flooding will negatively impact some larger housing units and businesses.

Table B. Census Tables

1990 Data	Census Tract 0004	Census Tract 0005
Total Persons	8,342	3,559
White Persons	7,017	2,409
Black Persons	183	144
American Indian Persons	21	6
Asian or Pacific Islander Persons	34	0
Other Race Persons	1,087	1,000
Persons of Hispanic Origin	2,675	2,088
Total Households Owner Occupied	2,955	1,278
White	1,870	641
Black	19	18
American Indian	15	7
Asian or Pacific Islander	8	0
Other Race (largely Hispanic)	175	191
1989 Per Capita Income by Race		
White	$10,414	$ 7,680
Black	$ 2,282	$ 4,825
American Indian	$ 5,608	$30,000
Asian or Pacific Islander	$22,284	$ 0
Other (Hispanic)	$ 6,198	$5,088

EFFECTS OF THE ALTERNATIVES

Alternative 1—No Action Alternative

No Federal funding would be expended. If storms larger than the 50-year storm event do not occur, the existing structures should provide adequate flood protection, and no impacts should be realized. The 100-year storm event will overtop Floodwater Diversions 1 and 4 and will flow through the auxiliary spillways of Sites 1 and 2, potentially flooding up to 1,250 homes and businesses, and damaging up to 960.

During the 100-year project life, a reasonable probability exists that the 5,000-year storm event would occur causing a five foot depth of floodwater to flow through the auxiliary spillway of Site 1. This event will cause the auxiliary spillway to breach, which will release of large volumes of floodwater at very high rates of flow. In this event, Happy Valley will experience severe flooding, and the dikes along Southern Canal will fail sending floodwater through downtown Carlsbad. Soil erosion will increase as the auxiliary spillways, dams, sediment stored in the reservoirs, and dikes along Southern Canal are eroded. Sediment will be carried by floodwater and will decrease water quality. The failure of the dams will endanger the health and safety of about 2,350 residents and their property, which includes about 1,250 home and businesses (500 west of the Southern Canal and 750 east of Southern Canal). Only those cultural resources that are already at risk in the flood plain will be affected. The failed dams will affect transportation, because the present road culverts are not large enough to handle increased flood flows. Roads across Hackberry Draw could wash out, and drivers on flood-swollen roads could be swept off the roadway. Loss of life is a possibility. Individual septic systems and public water and gas lines may be exposed and broken by floodwater, or suffer from infiltration and

system failure Septic effluent and broken water lines are a health hazard and could result in disease. Broken gas lines could result in uncontrolled fires.

The cleanup and recovery from this event will require all local medical and emergency personnel. The hospital would be on alert and emergency shelters would be opened in area schools. In addition, Carlsbad or Eddy County would ask for the assistance of the National Guard and the Governor would probably request assistance from the Federal Emergency Management Agency (FEMA). The flood damages would encompass about 1250 homes and businesses with an estimated property value of $66,000,000. The cost of cleanup and recovery would include reconstruction of damaged homes, businesses, road and streets, utilities (such as water and gas lines, telephone and cable TV lines, and power poles), and pipelines (used by the extraction industry for natural gas and crude oil). The cost of cleanup and recovery would also include overtime for City and County public works personnel and the Sheriff's Office and Police Department. The cost would also include the cost of mobilizing and using emergency personnel from the NM Office of Emergency Management, the National Guard, and FEMA.

The high economic cost is described in the preceding paragraph. However the mental anguish, stress, and suffering due to deaths and loss of homes and possessions would be very high. This alternative will have a negative impact on all the persons living within the flood plain, regardless of ethnicity or income level. All persons in the lower income levels, many of whom are living below the poverty level, would be more adversely affected since they have limited means to recover from flood damage. They may not be carrying any insurance, particularly flood insurance, or their insurance coverage may be too low to permit recovery and rebuilding. Health related problems due to standing water, with its poor quality and insect breeding, would certainly increase for these low-income households.

Alternative 2—Decommission the Dams

For this alternative, existing dams would be removed; project activities would include removing dams at Sites 1 and 2; stabilizing sediment stored in the current pool areas; constructing flood walls and dikes on approximately 135 urban lots for flood proofing; demolishing approximately 825 buildings in the floodplain; and revegetating disturbed areas. Removal of the dams and stabilization of the pool area will disturb approximately 25 acres of wildlife habitat; building demolitions will raise disturbed area to approximately 105 acres. Existing pipes, inlets, outlets, and non-salvageable demolished buildings will generate substantial waste material, which will require appropriate disposal.

This alternative will cost $32.1 million, including a 65 percent (or $20.9 million) Federal share and 35 percent (or $11.2 million) local match. All flood prevention effects of the dams will be lost, and flooding will be greater than has been experienced in the last 34 years. However, flood damage to improvements will be less than experienced prior to installation of the dams, because damageable property will be moved out of the 100-year flood plain. The flood plain area could be developed for uses that are compatible with periodic flooding. These uses include agriculture, parks, and day-use recreation. There would be flood and sediment damage to cropland.

In the event of a 5,000-year storm event occurs, floodwater will exceed the 100-year flood plain. The 100-year flood plain will carry most of the floodwater. However, there will be flood and sediment damage to treated buildings and property inside the 100-year floodplain and untreated buildings and properties outside the floodplain. Disturbance to natural rangeland habitat will

amount to approximately 25 acres. An additional one-acre area of disturbance is expected for equipment storage, parking, and maintenance. Workers doing equipment maintenance are required to capture waste oil, trash, and solvent for proper disposal. This disturbed area of 26 acres is less than 0.01 percent of the natural rangeland habitat in the project area. The disturbance to urban landscaping will amount to approximately 107 acres, which is about 0.02 percent of the miscellaneous land in the project area.

During construction, air quality, soil erosion, and water quality will be adversely affected to a minor degree. This effect will occur during the 180-day construction period, during the construction of flood proofing measures at individual homes and businesses, and during the destruction of buildings after residents and contents have been relocated.

Downstream Historic structures as well as prehistoric sites could be affected by the removal of the dams; potential disturbances include flood damage and/or disturbance during installation of flood proofing measures or implementation of the relocation program.

Affects on individual households and the community would be mixed. This alternative would generally have a positive economic impact on all persons living within the flood plain, regardless of ethnicity or income level. This alternative will move residents out of the 25-year flood plain. All relocated households would enjoy the same or better housing, which would probably be newer. They would not have to purchase flood insurance and, therefore, would enjoy more disposable income. Health related issues related to standing water and insect breeding would no longer affect relocated households. However, relocation or moving is a stressful and unpleasant experience, and the lives of 2,350 residents would be severely disrupted. It is unlikely that the existing cohesive community could be re-established.

Relocation of 825 homes and businesses will positively affect the local economy if individuals choose to relocate in the community. The availability of 825 equivalent houses will require construction and infrastructure improvements. Businesses and others will experience a boon as homes are built, furnished, and landscaped. Alternatively, the number of individuals moving over a short period of time would negatively impact productivity in Carlsbad.

This alternative will also affect existing transportation, because the present road culverts are not large enough to handle increased flood flows. Roads across Hackberry Draw could wash out, and drivers on flood-swollen roads could be swept off the roadway or delayed. Loss of life is a possibility. Individual septic systems would no longer be in use, and therefore, septic effluent would not effect human health or water quality. Public water and gas mainlines may be eroded and broken by floodwater. Broken water mainlines are a health hazard and could result in disease. Broken gas mainlines could result in uncontrolled fires. Thus, human health and safety could be affected. This alternative will affect recreation and visual resources within the project area.

Alternative 3—Relocation and Flood-proofing

For this alternative, the action is limited to constructing floodwalls and dikes for flood proofing, demolishing vacant buildings, and revegetating disturbed areas. Flood walls and dikes will be constructed on about 60 urban lots and will disturb about one acre of urban landscaping. Demolition will be completed on about 320 city lots. This will require special handling and disposal of hazardous material (i.e., asbestos) and will disturb approximately 40 acres. The

disturbance to urban landscaping will amount to approximately 41 acres, which is about 0.01 percent of the miscellaneous land in the project area.

This alternative will cost $12.4 million, including a 65 percent (or $8.1 million) Federal share and 35 percent (or $4.3 million) match. Existing dams and diversions will remain in place, and storm events at or above the 100-year storm event criteria will overtop Floodwater Diversions 1 and 4 and will flow through the auxiliary spillways of Sites 1 and 2. However, damageable property within the 100-year flood plain would be substantially reduced, and flood proofing will afford remaining properties protection meeting all national and state standards and criteria for public safety on low-hazard dams. The flood plain area could be developed for uses that are compatible with periodic flooding, including agriculture, parks, and day-use recreation.

During construction, air quality, soil erosion, and water quality will be affected to a minor degree. This effect will occur during the construction of flood proofing measures at individual homes and businesses and during the destruction of buildings after residents and contents have been relocated. Flood proofing and relocation will affect historic structures that are still intact and in use.

Affects on individual households and the community would be mixed. This alternative will generally have a positive economic impact on many persons living within the flood plain, regardless of ethnicity or income level. This alternative will move many residences out of the flood plain. All relocated households would enjoy the same or better housing, which would probably be newer. The relocated residents would not have to purchase flood insurance and, therefore, would enjoy more disposable income. Health related issues related to standing water and insect breeding would no longer affect relocated households. However, these health issues would still have a negative impact on those households that are not relocated. Also, relocation or moving is a stressful and unpleasant experience, and the lives of 850 residents would be severely disrupted. The sustainability of the community could be diminished. This number of individuals moving over a short period of time could impact productivity in Carlsbad.

Relocation of 320 homes and businesses will positively affect the local economy. The need for 320 equivalent houses will require construction and infrastructure improvements. Businesses and others will experience an economic surge as homes are built, furnished, and landscaped. This alternative will not affect recreation within the project area, because the flood plain west of Southern Canal will most likely revert to cropland.

During the evaluated project life, 5,000 year storm event could occur, and this event will cause the auxiliary spillway to breach and the dam to fail, releasing large volumes of floodwater at a very high rate of flow. Potential impacts of this event due to relocations and flood proofing would be higher than in alternatives two and four, though they would be less severe than would be anticipated in the no action alternative. Happy Valley will experience severe flooding, and the dikes along Southern Canal will fail sending floodwater through downtown Carlsbad. Erosion and sedimentation will affect historic structures as well as prehistoric sites, which may be washed away or buried. Flood and sediment damage, soil erosion, and water quality will be affected. Dam failure will cause flooding and sediment damage throughout the project area. Soil erosion will increase as the auxiliary spillways, dams, sediment stored in the reservoirs, and dikes along Southern Canal are eroded. The eroded sediment will be carried by floodwater and will impact water quality. Sediment will be deposited on cropland, in Happy Valley, and throughout Carlsbad.

The failure of the dams will endanger the health and safety of about 1,500 residents and their property, which includes about 750 homes and businesses. The 750 affected buildings would include those houses and businesses located east of Southern Canal and inside the 100-year flood plain. Flooding of these buildings will negatively impact all ethnic groups and income levels. The effected public may include other individuals not in the flood plain due to travel disruptions, business impacts or other unanticipated flooding issues. Failure of the dams would have serious adverse impacts to human health and safety. The failed dams will affect transportation because the present road culverts are not large enough to handle increased flood flows. Roads across Hackberry Draw could wash out, and drivers on flood-swollen roads could be swept off the roadway. Loss of life is a possibility. Individual septic system and public water and gas lines may be eroded and broken by floodwater. Septic effluent and broken water lines are a health hazard and could result in disease. Broken gas lines could result in uncontrolled fires.

The cleanup and recovery from dam failure will require all local medical and emergency personnel. The hospital would be on alert and emergency shelters would be opened in area schools. In addition, Carlsbad or Eddy County would ask for the assistance of the National Guard and the Governor would probably request assistance from the FEMA. The flood damages would encompass about 750 homes and businesses with an estimated property value of $40,000,000. The cost of cleanup and recovery would include reconstruction of damaged homes, businesses, road and streets, and utilities (such as water and gas lines, telephone and cable TV lines, and power poles). The cost of cleanup and recovery would also include overtime for City and County public works personnel and the Sheriff's Office and Police Department. The cost would also include the cost of mobilizing and using emergency personnel from the NM Office of Emergency Management, the National Guard, and FEMA.

The high economic cost is described in the preceding paragraph. However the mental anguish, stress, and suffering due to deaths and loss of homes and possessions would be very high. This alternative will have a negative impact on all the persons living within the flood plain, regardless of ethnicity or income level. All persons in the lower income levels, many of whom are living below the poverty level, would be more adversely affected since they have limited means to recover from flood damage. They may not be carrying any insurance, particularly flood insurance, or their insurance coverage may be too low to permit recovery and rebuilding. Health related problems due to standing water, with its poor quality and insect breeding, would certainly increase for these low-income households.

Alternative 4—Rehabilitate the Dams

Both options in this alternative include physical improvements to Sites 1 and 2 and Floodwater Diversion 1. Option One is to raise the top of Site 1 by five feet, the top of Site 2 by three feet, and the top of Floodwater Diversion 1 by 1.5 feet. This option will require construction of an 18-foot wide earthen berm on the upstream embankment slope. Material from the pool area will be used to build the berm and add the extra height. Approximately 50 acres of habitat in the pool area will be disturbed as borrow material is removed. The disturbed area at the toe of the dam will be approximately 10 acres. The principal spillway pipes will be lined with an insert of HDPE pipe, which will be grouted in place, and the concrete inlet towers will be replaced. At Site 1, New Mexico Highway 524 will be stabilized to allow the roadway to act as an auxiliary spillway, and a gas well may need to be raised above the elevation of the 100-year flood pool. If necessary, this gas well will be capped to prevent gas or oil from escaping into water in the pool.

Upgrade Option Two includes hardening the auxiliary spillways and downstream face of the dams with soil cement. Material from the pool area will be used for the soil cement. The borrow area will disturb about 40 acres of habitat, and the disturbed area along the downstream face of the dam will be about six acres.

For Option One, the disturbance to natural rangeland habitat will amount to approximately 60 acres. An additional two-acre area of disturbance is expected for equipment storage, parking, and maintenance. Workers doing equipment maintenance are required to capture waste oil, trash, and solvent for proper disposal. The total disturbed area will be approximately 62 acres, which is less than 0.01 percent of the natural rangeland habitat in the project area. For Option Two, the disturbance to natural rangeland habitat will amount to approximately 46 acres. An additional two-acre area of disturbance is expected for equipment storage, parking, and maintenance. The total disturbed area will be approximately 48 acres, which is less than 0.01 percent of the natural rangeland habitat in the project area.

In other respects, the two options have very similar effects. Preliminary estimates indicate that either would cost an estimated cost of $2.1 million dollars to construct, including a 65 percent (or $1.4 million) Federally funded component and a 35 percent (or $700,000) local match. Both would include improvements to FD-1 and the rehabilitated dams will meet current New Mexico and NRCS standards and criteria for public safety and reduce risk of catastrophic failure. In the event of the 100-year storm event, either option would protect approximately 960 homes and businesses including 380 west of Southern Canal and 580 east of Southern Canal. Human health and safety will be improved by protecting approximately 2,350 residents and 1,250 houses and businesses. These individuals will not be threatened by failure of dams, which were constructed to provide flood protection to agricultural land. The dams will be designed to protect urban and residential areas.

During the evaluated project life when the 5,000-year storm event occurs, the upgraded dams will capture the floodwater and will not fail. There will be a large discharge of floodwater, because the auxiliary spillways will function. This large discharge will cause flood and sediment damage to buildings and property. However, since dam failure will not occur, flood damage will be substantially less than in the other alternates as floodwaters will be shallow and will move slowly.

Air quality, soil erosion, and water quality will be adversely affected to a minor degree during the 180-day construction period. Visual resources will be affected to a minor degree during construction. All prehistoric and historic sites will be avoided by the rehabilitation of the dams. In addition, this alternative will provide additional protection to sites that are located in the flood plain. Flood and sediment damage, recreation, and transportation will remain the same as during the last 34 years and, therefore, will not be affected by this alternative.

This alternative, regardless of whether Option One or Two is used, has a positive impact for all persons, especially those living within the flood plain. Hence, it would positively affect a large population of lower income minorities and disadvantaged individuals. All flooding up to the 100-year storm event will be controlled, and 960 homes and businesses would be protected against flood damage.

COMPARISON OF THE ALTERNATIVES

Table C summarizes the extent to which each alternative meets the project specific purpose and need. Only Alternative 1 completely the project need. Alternative 1 does not provide for safe and reliable dams nor does it meet standards for public safety and capacity of dams or protect urban land from damage by the 100-year storm event. Alternative 2 does not protect cropland from damage by the 50-year storm event. Alternative 3 does not provide safe and reliable dams and does not protect urban land east of Southern Canal from damage by the breach discharge and the 100-year storm event. Both Options of Alternative 4 meet the purpose and need.

Table C. Comparison of Alternatives—Effect on Needs

Alternative	Safety and Reliability of the Dams	Flood Protection			Meet standards for public safety and capacity
		Against 100-year storm event		50-year storm event	
		In Rural Subdivisions	Within Carlsbad	On Agricultural Cropland	
1-No Action Alternative	No	No	No	**Yes**	No
2-Decommission the Dams	**Yes**	**Yes**	**Yes**	No	**Yes**
3-Relocation and Flood-proofing	No	**Yes**	No	**Yes**	**Yes**
4-Rehabilitate the Dams	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

Alternative 4 also best meets other applicable Federal objectives, addressing potential civil rights concerns and the requirements established by "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies" (P&G). Based on the civil rights impact analysis and from the perspective of environmental justice, Alternative 4 provides the best combination of beneficial effects for all people, residences, and businesses located in the project area, with the lowest adverse implementation impacts, including minorities and disadvantaged individuals as well as low-income households.

P&G requirements apply to the current project and have been used in planning of this action. The manual specifies methodology for calculating economic effects and for evaluating and displaying social and environmental factors in a format unique to P&G. The manual includes requirements for scoping, public participation, and equal treatment of all alternatives that are equivalent to those for NEPA. The P&G manual established four accounts to summarize both positive and negative effects of water projects: the National Economic Development (NED) account, the Environmental Quality (EQ) account, the Other Social Effects (OSE) account, and the Regional Economic Development (RED) account. The accounts describe impacts to various elements of the natural and human environment described explicitly above, and summarize relationships between other elements of NEPA like the relationship between short-term use of resources (e.g. land, limited public funds, etc) and maintenance of long term productivity (e.g. improved flood protection). The analyses and computations used to develop Table D follow P&G guidelines, and supporting documentation is available at the address shown on page 1. As the Table D indicates, Alternative 4 is the alternative that reasonably maximizes net national economic development (NED) benefits and is most consistent with the Federal objective; accordingly it has been designated the NED alternative.

Table D—Summary and Comparison of Candidate Plans

Effects	Alternative 1 No Action	Alternative 2 Decommission the Dams	Alternative 3 Relocation and Flood-proofing	Alternative 4 Rehabilitate the Dams
Measures	Keep the existing works (2 floodwater retarding dams and 4 floodwater diversions).	Keep 4 existing diversions, remove 2 dams, relocate 825 buildings units, and flood proof 135 building units.	Keep the existing structures (2 dams and 4 diversions), relocate 320 buildings units, and flood proof 60 building units.	Keep 3 existing diversions; upgrade 2 dams and 1 diversion by raising the height or hardening the dams.
Project investment	$0	$32,100,000	$12,400,000	$2,100,000
National Economic Development Account				
Beneficial Annual	$770,900 [3]	$1,319,200	$1,319,200	$770,900
Adverse Annual	$17,700	$2,060,600	$810,900	$161,700
Net beneficial	$753,200	(741,400)	508,300	$609,200
Regional Economic Development Account				
Beneficial effect Annualized Region Rest of Nation	 $770,900 $770,900 $0	 $1,319,200 $1,319,200 $0	 $1,319,200 $1,319,200 $0	 $770,900 $770,900 $0
Adverse effect Annualized Region Rest of Nation	 $17,700 $17,700 $0	 $2,060,600 $727,700 $1,332,900	 $810,900 $296,000 $514,900	 $161,600 $74,400 $87,200
Environmental Quality Account				
Air quality	No effect.	Short-term degradation during construction.	Short-term degradation during construction.	Short-term degradation during construction.
Ephemeral gully erosion	No effect.	No effect.	No effect.	No effect.
Fish habitat	No effect.	No effect.	No effect.	No effect.
Important agricultural land	No effect.	No effect.	No effect.	No effect.
Mineral resources	No effect.	No effect.	No effect.	No effect.
Noxious weeds	No effect.	No effect.	No effect.	No effect.
Riparian areas	No effect.	No effect.	No effect.	No effect.
Soil erosion	Long-term degradation due to dam failure.	Short-term degradation during construction.	Short-term degradation during construction.	Short-term degradation during construction.
Threatened and endangered species	No effect.	No effect.	No effect.	No effect.
Visual resources	Long-term degradation due to dam failure.	Change from urban to cropland or green belt.	Long-term degradation due to dam failure.	No effect.
Water quality	Long-term degradation due to dam failure.	Short-term degradation during construction.	Short-term degradation during construction; Long-term degradation due to dam failure	Short-term degradation during construction.
Water quantity	No effect.	No effect.	No effect.	No effect.
Wetlands	No effect.	No effect.	No effect.	No effect.
Wildlife habitat	Minimal effect.	Minimal effect.	Minimal effect.	Minimal effect.

[3] Note: The average annual benefit of this alternative is only realized if project structures remain intact; if one or more dams or diversions fail, these benefits would diminish or disappear, up to $66,000,000 of downstream property could be damaged, and outer costs described above could result.

Table D—Summary and Comparison of Candidate Plans (Continued)

Effects	Alternative 1 No Action	Alternative 2 Decommission the Dams	Alternative 3 Relocation and Flood-proofing	Alternative 4 Rehabilitate the Dams
Other Social Effects Account				
Cultural resources	No effect.	Adverse impact on sites near the dams and historic structures due to flood proofing or relocation.	Adverse impact on sites near the dams and historic structures due to flood proofing or relocation.	Improved protection of sites located in flood plain.
Human health and safety	2,350 people are at risk.	2,350 people relocated or flood proofed.	850 people relocated or flood proofed and 1,500 people still at risk.	Highest standards met for dam safety and 2,350 people have minimal risk.
Minority or disadvantaged groups	Adverse effect on these groups who live in flood plain.	Beneficial effect on these groups due to equal or better housing.	Beneficial effect on these groups due to equal or better housing.	Highest standards met for dam safety and these groups have minimal risk.
Flood and sediment damage	1,250 homes are at risk.	825 building units relocated and 135 flood proofed.	320 building units relocated and 60 flood proofed and 750 building units still at risk.	Highest standards met for dam safety and 1,250 homes have minimal risk.
Municipal and industrial water	No effect.	No effect.	No effect.	No effect.
Navigation	No effect.	No effect.	No effect.	No effect.
Recreation	No effect.	Change from urban to cropland or green belt.	No effect.	No effect.
Rural water supply	No effect.	No effect.	No effect.	No effect.
Transportation	Roads and utilities are at risk due to dam failure.	Undersized culverts and roadways prone to flooding.	Roads and utilities are at risk due to dam failure.	No effect.

PERSONS AND AGENCIES CONSULTED

The NRCS and project sponsors have actively solicited public input throughout the study process. Major meetings and opportunities for input are discussed in the following paragraphs. Members of the public had an opportunity to provide comments and identify concerns on March 1, 2000 during a meeting of the Hackberry Draw Watershed District. In addition, comments and concerns are accepted during the monthly meetings of the Carlsbad Soil and Water Conservation District, which meets the first Monday of each month at 5:00 p.m. Comments and concerns are also accepted during meetings of the Hackberry Draw Watershed District, which meets as needed to conduct business.

During August 2000, NRCS contacted Federal, state, and local agencies and organizations for comments and to identify concerns. A letter requesting specific concerns and issues was sent to the following agencies and organizations:

Mr. Larry K. Burnett, State Executive Director, Farm Services Agency, 6200 Jefferson, NE, Suite 211, Albuquerque, NM 87109

Ms. Stephanie Gonzales, State Director, Rural Development, 6200 Jefferson, NE, Suite 255, Albuquerque, NM 87109

Ms. Eleanor Towns, Regional Forester, Forest Service, 517 Gold Avenue, SW, Room 117, Albuquerque, NM 87102

Lt. Col. Raymond G. Midkiff, Army Corps of Engineers, 4101 Jefferson Plaza, NE, Albuquerque, NM 87109

Ms. M. J. Chavez, State Director, Bureau of Land Management, P.O. Box 27115, Santa Fe, NM 87502-0115

Mr. Greg Cook, Regional Administrator, Environmental Protection Agency, Region VI, 1445 Ross Avenue, Dallas, TX 75202-2733

Ms. Nancy Kaufman, Regional Director, Fish and Wildlife Service, P.O. Box 1306, Albuquerque, NM 87103

Ms. Joy Nicholopoulos, Field Supervisor, New Mexico Ecological Services, Fish and Wildlife Service, 2105 Osuna, NE, Albuquerque, NM 87113

Ernesto Rodriguez, State Director, Emergency Management, New Mexico Department of Public Safety, P.O. Box 1628, Santa Fe, NM 87504-1628

Director, Game and Fish Department, P.O. Box 87504, Santa Fe, NM 87504

Mr. Elmo Baca, State Historic Preservation Officer, Office of Cultural Affairs, Villa Rivera, 228 E. Palace Avenue, Room 101, Santa Fe, NM 87503

Mr. Thomas C. Turney, State Engineer, Office of the State Engineer, P.O. Box 25102, Santa Fe, NM 87503

Mr. John Horning, Forest Guardians, 1411 Second Street, Santa Fe, NM 87505

National Audubon Society, New Mexico State Office, P.O. Box 9314, Santa Fe, NM 87504

Thomas Jervis, Ph.D., President, New Mexico Audubon Council, 60 Barranca Road, Los Alamos, NM 87544

Mr. Ed Machen, President, New Mexico Wildlife Federation, 3240-D Juan Tabo NE, Suite 10, Albuquerque, NM 87111

Lois Herrmann, Sangre de Cristo Audubon Society, 530 Calle Corve, Santa Fe, NM 87501-2711

Mr. Jay Sorenson, President, Sierra Club, 207 San Pedro, NE, Albuquerque, NM 87108

Mr. William Waldman, State Director, The Nature Conservancy, 212 E. Marcy Street, Suite 200, Santa Fe, NM 87501

In January and February 2001, presentations regarding this undertaking were made to the Carlsbad Downtown Lions Club and the Downtown Rotary Club. On February 6, 2001, the project was presented to the Eddy County Commission. Comments and concerns were accepted during these presentations.

During the week of January 22, 2001, the Hackberry Draw Watershed District conducted an outreach campaign regarding this project. Brochures and flyers were distributed by hand, posted in businesses, and printed in newspapers. Public service announcements were broadcast over local radio stations. The flyers, brochures, and announcements were in English and Spanish.

The San Jose Catholic Church included the flyer in their newsletter. Comments and concerns were received during the distribution process.

Consultation with the appropriate tribes is being initiated to identify any concerns they may have about this undertaking.

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APPENDIX A—ENVIRONMENTAL ASSESSMENT SUPPORTING DATA

Table A-1 – Installation Cost for Hackberry Draw Watershed, New Mexico

Installation Cost Items	Unit	Number Federal Land	Number Nonfederal Land	Number Total	Public Law 83-566 Funds Federal Land	Public Law 83-566 Funds Nonfederal Land-SCS	Public Law 83-566 Funds Total	Other Funds Federal Land	Other Funds Nonfederal Lands SCS	Other Funds Nonfederal Lands Sponsor	Other Funds Total	Total
Land Treatment					Amounts shown in Dollars							
Conservation Cropping System	Acre	0	1,444	1,444	0	0	0	0	2,888	0	2,888	2,888
Crop Residue Use	Acre	0	221	221	0	0	0	0	1,105	0	1,105	1,105
Ditch Lining	Linear Ft.	0	2,000	2,000	0	0	0	0	4,900	0	4,900	4,900
Field Ditches	Linear Ft.	0	1,910	1,910	0	0	0	0	955	0	955	955
Irrigation Water Management	Acre	0	1,024	1,024	0	0	0	0	379	0	379	379
Irrigation Pipeline	Linear Ft.	0	4,714	4,714	0	0	0	0	14,142	0	14,142	14,142
Land Leveling	Acre	0	38	38	0	0	0	0	2,660	0	2,660	2,660
Range Proper Use	Acre	0	6,380	6,380	0	0	0	0	12,760	0	12,760	12,760
Structure for Water Control	Each	0	109	109	0	0	0	0	1,373	0	1,373	1,373
Land Treatment Subtotal					0	0	0	0	41,162	0	41,162	41,162
Structural Measures												
Floodwater Retarding Structure	Each	0	2	2	0	2,629,469	2,629,469	0	6,007	5,000	11,007	2,640,476
Floodwater Diversion	Linear Ft.	0	28,410	28,410	0	3,249,666	3,249,666	0	11,095	41,062	52,157	3,301,823
Outlet Channel with appurtenances	Linear Ft.	0	3,060	3,060	0	45,606	45,606	0	440	3,000	3,440	49,046
Technical Assistance					0	1,436,079	1,436,079	0	0	1,394	1,394	1,437,473
Structural Subtotal					0	7,360,820	7,360,820	0	17,542	50,456	67,998	7,428,818
Total Cost for Installed Project Work					0	7,360,820	7,360,820	0	58,704	50,456	109,160	7,469,980

This table shows actual costs for all installed measures.

Determination of No Effect on Endangered and Threatened Species

A literature search of endangered and threatened species listed for Eddy County, provided by the USFWS on October 24, 1997, was performed to determine biological requirements of each species. The life requirements for each species were compared to existing physical habitat on the site. Multiple sources were consulted as listed in the References.

Fourteen species are listed for Eddy County. Brief results of the research are discussed below:

1. Black footed ferret – endangered – The work site contains no prairie dog communities. The site has gravelly, limestone soil, which is difficult to dig. Ferrets require prairie dogs as their main food source.
2. American peregrine falcon – endangered – The work site has no water, cliffs, rock outcrops, or trees for nesting and hunting.
3. Arctic peregrine falcon – threatened – The work site has no water, cliffs, rock outcrops, or trees for nesting and hunting.
4. Bald eagle – threatened – The work site has no riparian trees for nesting, nests, water, or fish.
5. Brown pelican – endangered – The work site contains no water, fish, or wetlands. It is 400 to 500 miles from an ocean and 80 miles from Bitter Lake National Refuge.
6. Interior least tern – endangered – The work site has no water, fish, mud flats, or sandbars.
7. Mexican spotted owl – threatened – the work site has no old-growth forests or trees.
8. Northern Aplomado falcon – endangered – The work sites has no grassland. It has only shrubland.
9. Pecos bluntnose shiner – threatened with critical habitat – The work site has no permanent water.
10. Pecos gambusia – endangered – There is no permanent water on the site.
11. Gypsum wild buckwheat – threatened with critical habitat – Occurrence is possible on gypsum soils, some of which occur on the site. A field search of the work site by NRCS Rangeland Management Specialists found no occurrence.
12. Kuenzler hedgehog cactus – endangered – The work site is too low in elevation for this species to occur. There is no pinon-juniper community.
13. Lee pincushion cactus – threatened – The site is too low in elevation for this species.
14. Lloyd's hedgehog cactus – endangered – The site is too low in elevation for the species.

Candidate Species are not protected under the ESA. However, NRCS is concerned with their declining status and will take measures to protect them. Three candidate species are listed for Eddy County.

1. Pecos pupfish – The work site has no water.
2. Lesser prairie chicken – The site is not grassland and does not have adequate habitat.
3. Black tailed prairie dog – There are no prairie dog towns on site.

Species of concern are not protected by the Endangered Species Act and are included here for information only and to clarify NRCS action related to these species. Twenty-five species of concern were considered in this review.

In personal communication in 1997 with Roger Ford, Planning Engineer, NRCS, John Pettinger, Biologist, NM Department of Game and Fish, indicated that the Department had no concerns with this project relating to species of concern listed by the Department.

The work site contains marginal habitat, at best, for the swift fox. There are no cliffs, rock outcrops, rock piles, or other distinguishing features to provide prey species, den sites, escape cover, or resting places. A fox might dig a den in the area, but the proximity to hunting is limited. The close proximity to humans and their pet dogs puts severe limitations on this species thorough direct predation and loss of prey species such as rabbits. A search of the work site was done and revealed no possible fox dens.

There is no habitat for the eight bat species on the list. The only possible use of the area by bats is occasional foraging, but the proximity to the Pecos River and other riparian areas make this site very poor for insect production. No caves, mine shafts, rock outcrops, cliffs, or trees occur on the site for roosting or nesting.

No water on the site makes it unusable for any fish, muskrat, tern, ibis, snail, or mussel.

The lack of forest or trees makes the site unusable for chipmunk, pocket gopher, ferruginous hawk, shrike, and goshawk.

The Baird's sparrow migrates to Mexico in winter and could briefly use the area during migration. The natural grass cover on the site is not adequate for nesting.

The ferruginous hawk is a winter migrant in the area and could occasionally use the area for hunting. No trees exist for nesting. Very limited prey populations preclude much use by the hawk. This project is unlikely to impact the hawk due to very limited prey disturbance. No pesticides will be used on this project.

The Western burrowing owl uses mammal burrows for nesting. Such burrows are lacking in the project area, and there are no vertical eroded banks on the work site. Very minimal impacts to prey species will occur.

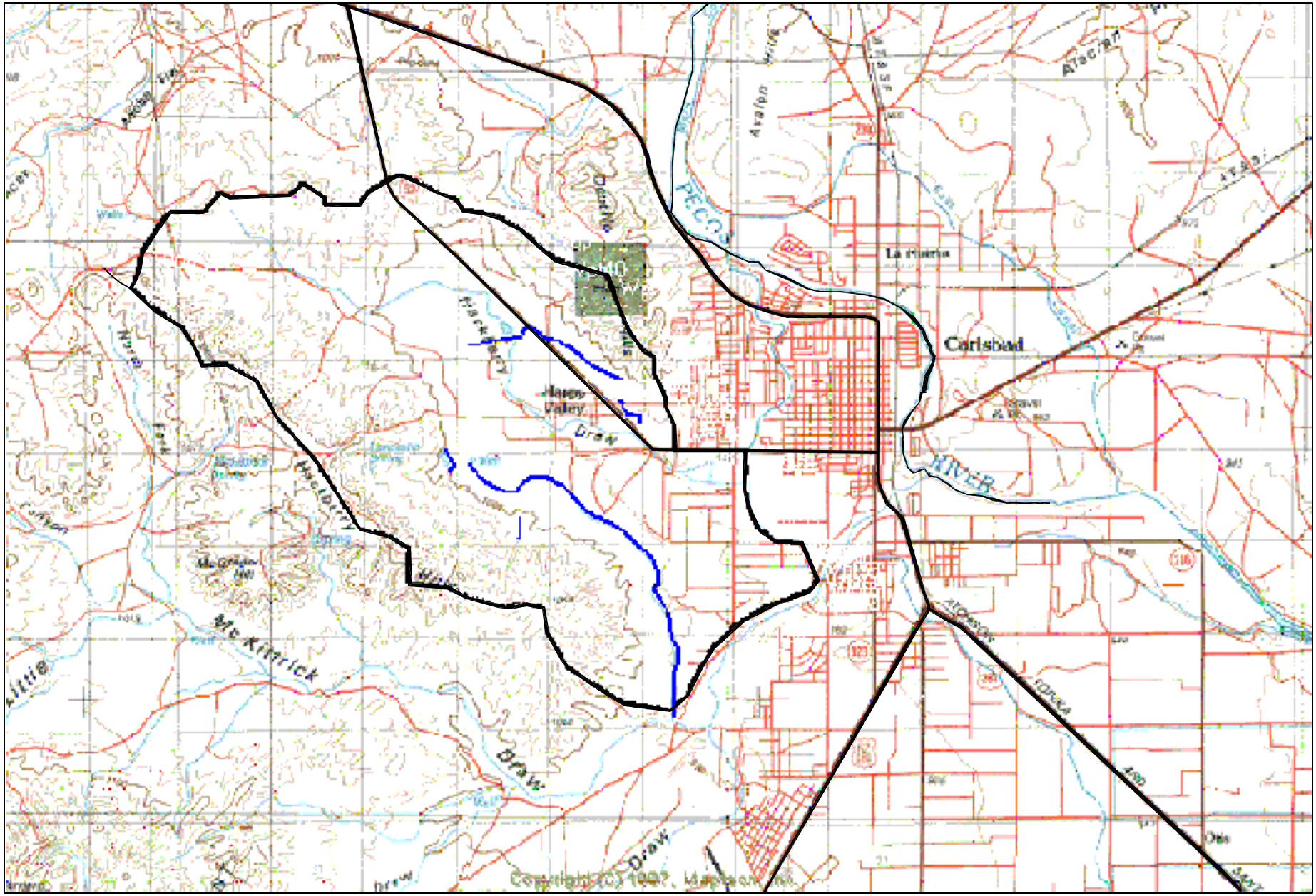
The Texas horned lizard is a possible resident of the work site. During construction, NRCS construction inspectors will look for these lizards on a daily basis and will move the lizards out of the work area as they are found. Pictures and species profiles will be provided to the inspection personnel.

All plants on the list are found at higher elevations and do not occur on the site.

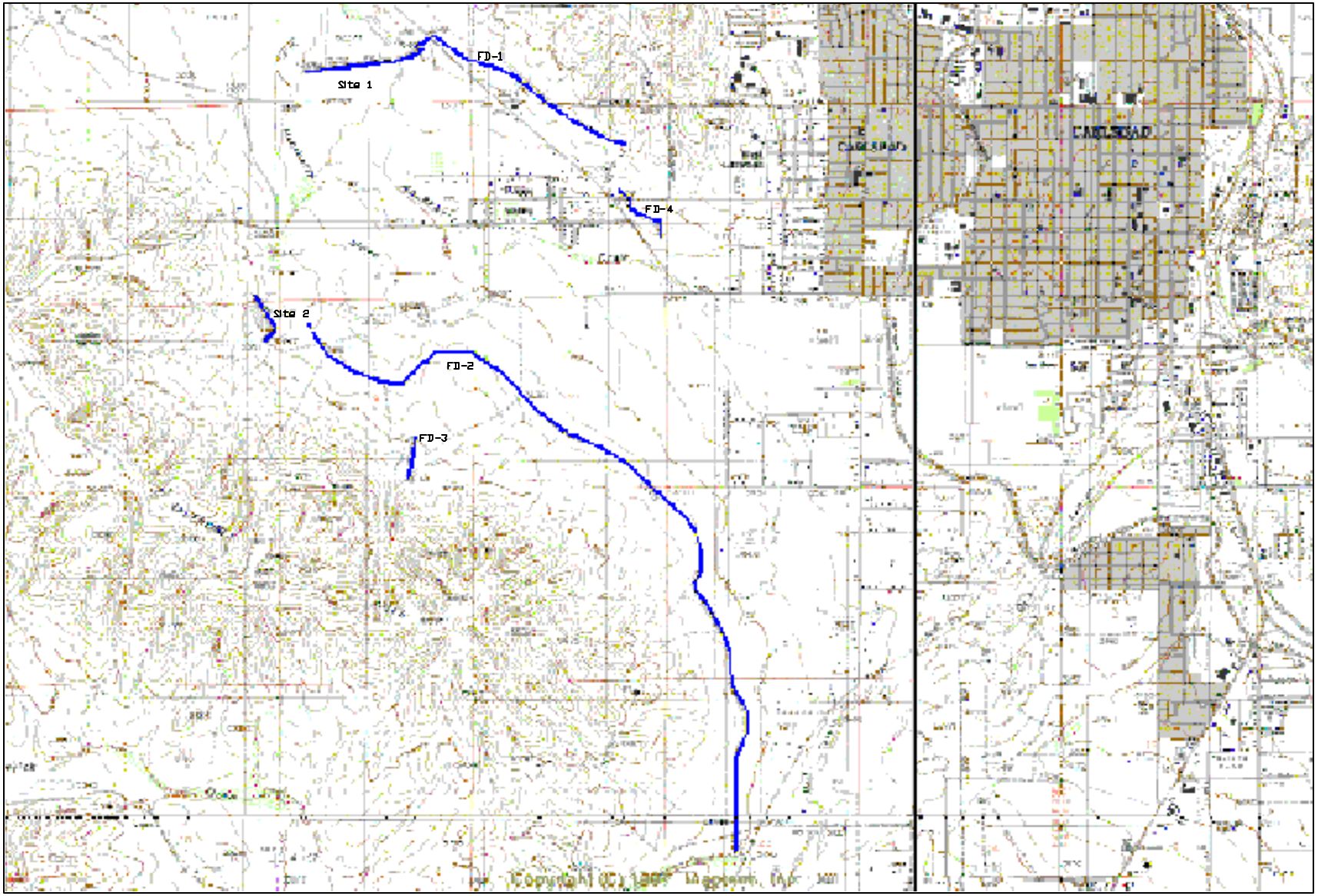
Other wildlife species associated with the plant communities are not part of the endangered species consultation and will not be impacted to any great extent. This is due to the small area actually impacted compared to the watershed area, the limited value of the area as habitat, the lack of water, the proximity to humans, and the nature of limey soils.

APPENDIX B—SUPPORTING MAPS

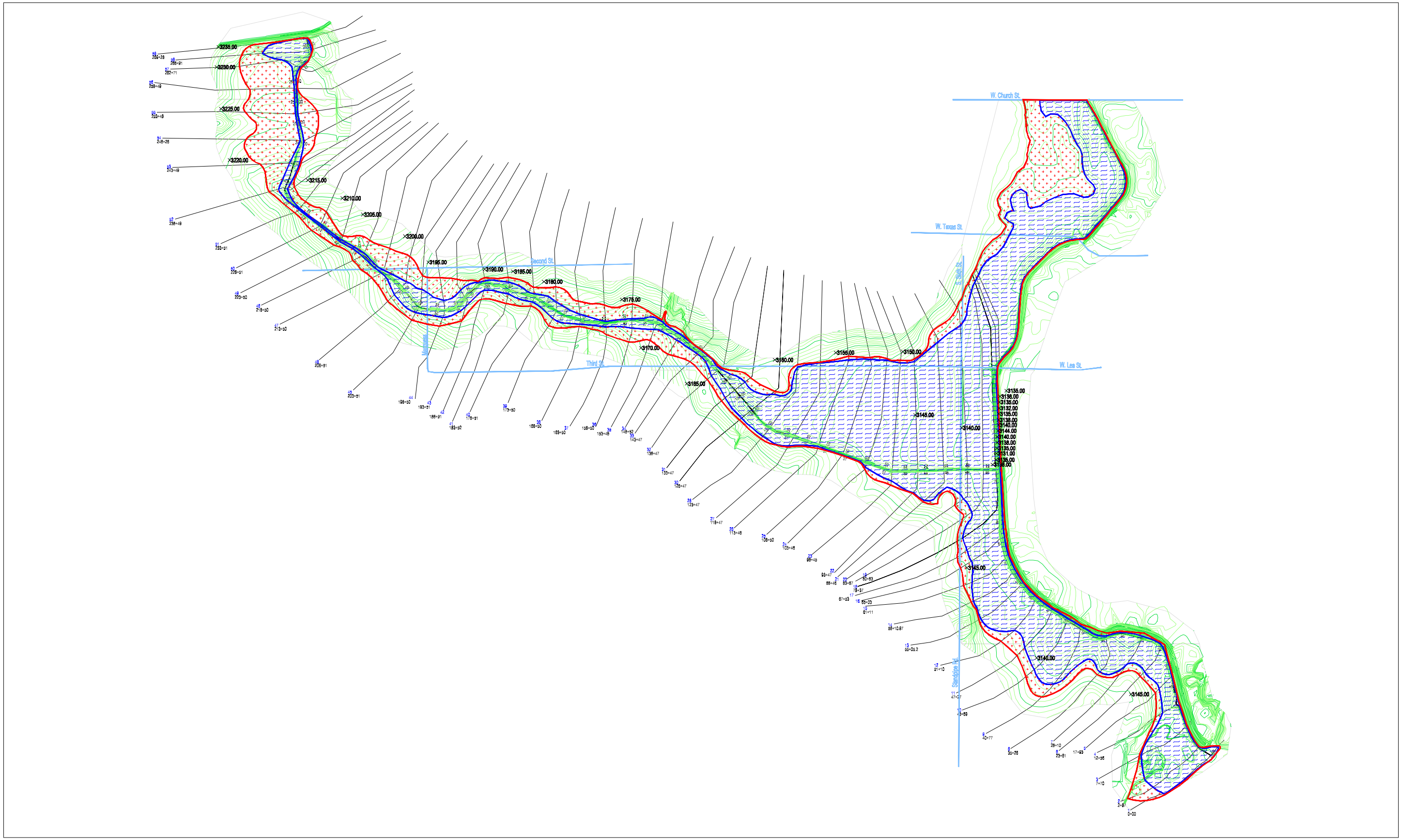
Hackberry Draw Watershed Project Map



Location of Project Measures near Carlsbad, New Mexico



Map of 100-Year Flood Plain with Existing Dams



Map of 100-Year Flood Plain for Decommissioning the Dams and Breach Flood Plain for Failure of Dams